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AUTHOR	Cober, John G.
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ABSTRACT

This document analyzes the costs of instructing a pupil in science, mathematics, or English for three school districts approximately five, eight, and fourteen thousand pupils in size. A detailed method of allocating instructional costs and other costs directly related to instruction, such as Social Security and retirement and employee benefits, is given in order that other school districts may use the method to calculate their own costs. Secondary per pupil costs in 1971-72 for the three districts ranged from $82.42 for mathematics in the 5,000-pupil district to $123.81 per pupil for science in the 14,000-pupil district. Size of district did not appear to be a major factor in the results. Findings revealed that pupil-teacher ratios, education and experience of the faculty, district salary schedule, use of aides, supervisor salaries, amount of teaching supplies, and administrative and school board policies were largely responsible for differences in per pupil costs between subject areas and among districts. (Author/DN)

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Cost of Teaching Different Subjects

Prepared by
John G. Cober
Division of Research
Pennsylvania Department of Education

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John C. Pittenger, Secretary

Office of Basic Education
Donald M. Carroll Jr., Commissioner
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Bureau of Information Systems
Seon H. Cho, Director

Division of Research
Robert B. Hayes, Director

Pennsylvania Department of Education
Box 911
Harrisburg, Pa. 17126

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SUMMARY

The question has often been asked, "What is the cost of instructing a pupil in a subject such as English, mathematics or science?" An answer is given for three different sized school districts of approximately 5,000, 8,000 and 14,000 pupils.

A detailed method of allocating instructional costs and other costs directly related to instruction such as Social Security, retirement and employe benefits is given so that other school districts may calculate their own costs.

Size of district did not appear to be a major factor in the results. Pupil-teacher ratios, education and experience of the faculty, district salary schedule, use of aides, supervisor salaries, amount of teaching supplies and administrative and school board policies were largely responsible for higher subject per pupil costs.

In 1971-72, the 8,000-pupil district had the lowest per pupil instructional costs in two subjects, the 5,000-pupil district in two subjects and the 14,000-pupil district in one subject. The 8,000-pupil district had the lowest cost for all foreign language subjects as a group and in kindergarten.

The 5,000-pupil district had the highest cost in one subject, the 8,000-pupil district in two subjects and the 14,000-pupil district in two subjects. The 5,000-pupil district had the highest cost for all foreign language subjects and the 14,000-pupil district had the highest cost for elementary (K-6).

Secondary per pupil costs in 1971-72 for the three districts ranged from $82.42 for mathematics in the 5,000-pupil district to $123.81 per pupil for science in the 14,000-pupil district.

This type of study is the first step which a district needs to take to evaluate output with cost. The subject teacher table giving the education, years of experience and salary can be developed by any local school district as a consideration in employing teachers. Evaluative criteria can be developed and intelligent decisions can be made regarding establishing new programs, changing existing programs, or dropping programs.

Problem

What is the instructional cost of teaching different subjects in three public school districts? Why and where do instructional costs differ?

Can a detailed procedure be developed by which any school district having an accounting capability may calculate its own subject costs?

Background of the Districts

The smallest district (4,603 pupils) is an urban school district with seven elementary schools, two junior high schools of 565 and 568 pupils and one senior high school of 1,034 pupils. Most of the pupils walk to school and the only transportation provided is to the area vocational-technical school. Very little is spent per pupil on transportation. Considerably more is spent per pupil on community service and student activities than in the other districts.

The median-sized school district (7,621 pupils) includes an urban community and an extensive rural residential type of area. The school district has 11 elementary buildings, two junior high schools of 1,008 and 904 pupils, about double the size of the smallest school's junior high schools, and a senior high school of 1,670 pupils, about 50 per cent larger than the smallest school's high school. The median-sized school spends about the same amount per pupil on transportation as the largest district. The median-sized district also has a policy which permits a principal to trade a teaching position for four teacher aides.

The largest district comprises an urban population and also surrounding semirural residential areas. The school district has 13 elementary buildings, four intermediate high schools, ranging from 1,100 to 1,267 pupils in size (100 to 200 pupils larger than the median district), and a senior high school (2,127 pupils), one-third larger than the median-sized district.

Tables 1, 2 and 3 list the pupil data, teacher-pupil ratio, sources of revenue per pupil, reimbursable expenditures and total expenditures per pupil.

TABLE 1

Background of the Districts
Pupil Data (1971-72)

	Average[1] Daily Membership	Fall[2] Enrollment	Black	Other	White	Exceptional	Poverty Students	Pupil-Teacher Ratio	Staff per 1,000 Enrollment
District A	4,603	5,015	916 (18%)	37 (.19%)	4,061	184	569 (11.4%)	19.4	60.0
District B	6,621	8,010	46 (.57%)	145 (2.38%)	7,819	41	254 (3.2%)	22.3	52.6
District C	13,279	13,995	176 (1.25%)	25 (1.43%)	13,794	169	494 (5%)	20.9	55.8

[1]Average daily membership as of the end of the first marking period. Used in the study for pupil enrollment calculations. Excludes intermediate unit special education pupils and vocational-technical students.

[2]Fall enrollments include special education pupils, vocational-teachnical pupils and postgraduate pupils. (Source: A Summary of Enrollments in Public Schools of Pennsylvania. Bureau of Educational Statistics, Pennsylvania Department of Education, Fall 1971.)

TABLE 2

Per Pupil Source of Revenue[1] 1971-72

	Local	State	Federal	Total
District A	$741.14	$390.53	$34.30	$1,165.97
District B	785.12	328.63	20.06	1,133.81
District C	838.40	379.82	6.61	1,224.83

[1]Calculated on enrollment as of October 1 (Col. 2) since state reimbursement is received for all students including special education and vocational-technical students.

TABLE 3

Expenditures 1971-72

	Reimbursable Expenditures Oct. 1 Enrollment	Total Expenditures Oct. 1 Enrollment
District A	$901.86	$1,058.36
District B	899.94	1,137.88
District C	889.75	1,127.39

Limitations

The study was limited to three school districts with computer capacity and accounting procedures which would provide the necessary data. Costs excluded in the analysis of the instructional cost of different subjects were:

0100 Administration

0600 Plant Operation, except:

- 0643 Equipment Replacement Instruction
- 0653 Contracted Repairs--Instructional Equipment

0700 Maintenance of Plant

0800 Fixed Charges only for the following:

- 0835 Fire and Extended Coverage
- 0836 Other Insurance
- 0837 Judgments against the School System
- 0838 Rent of Capital Facilities and Equipment
- 0839 Other Fixed Charges

0900 Food Services

1000 Student-Body Activities

1100 Community Services

0400 Health Services

0500 Pupil Transportation

1200 Capital Outlay, except:

- 1243 Instructional Equipment

1300 Debt Service

1400 Outgoing Transfers

Data Provided by the Three School Districts

The three districts provided the following data:

1. Computer printouts of per pupil costs for 1971-72 (actual expenses) and budgeted figures for 1972-73.

    a. Pupil enrollment by the following:

        (1) Kindergarten through grade 6
        (2) Secondary
        (3) Social studies
        (4) Mathematics
        (5) Science
        (6) Language arts
        (7) Foreign language
        (8) French I

    b. Pupil costs for social studies, mathematics, science, language arts (English), French I and foreign language as a total and elementary (K-6) by account name and codes.

    c. Average teacher salaries by subject taught.

    d. Pupil-teacher ratio for each subject.

2. Teacher's salary schedule for 1971-72 and 1972-73.

3. Buildings and enrollments 1971-72 and 1972-73.

4. Years of experience and degree level of teachers for each teacher by subject for 1971-72 and 1972-73.

5. Fringe benefits program for 1971-72 and 1972-73.

The Appendix gives the years of experience and degree level of the teachers for the three school districts in 1971-72. Budgeted data for 1972-73 was provided and is referred to briefly on page 25 of this report.

General Analysis of Per Pupil Cost Data

A cost per pupil comparison for the different subjects for 1971-72 for the three different school districts is shown in Table 4.

The largest district had the lowest per pupil cost in one subject (French I) included in this study and the highest cost per pupil in two secondary subject areas (mathematics and science) and the highest cost for elementary (K-6).

TABLE 4

Cost by Subject of Per Pupil Data
for 1971-72

Subject Areas	District		
	Small (4,603 Pupils)	Median (7,621 Pupils)	Large (13,279 Pupils)
K-6	$638.19	$637.75	$647.28
Social Studies	109.49	92.60	107.64
Mathematics	82.42	101.52	104.77
Science	98.13	96.80	123.81
English	90.81	107.25	106.01
Foreign Language	115.68	110.85	113.71
French I	112.17	113.27	92.09

The median-sized district had the lowest per pupil cost in two subject areas (social studies and science) as well as all foreign languages as a group and elementary costs (K-6). It had the highest cost in two subjects (English and French I).

The smallest district had the lowest per pupil cost in two subjects (English and mathematics) and the highest cost in one subject (social studies) and for foreign language subjects as a group.

The greatest range in costs was for science, while mathematics varied almost as much. Factors such as average salary of teachers, higher district salary schedule and educational preparation had considerable influence on the per pupil cost. The pupil-teacher ratio varied greatly and the different pupil-teacher ratio greatly affected the cost per pupil.

The largest differences existed between:

(a) Teacher and aide salaries
(b) Supervisor salaries
(c) Librarian salaries
(d) School district contribution to retirement
(e) School district share of employe insurance.

Teaching supplies expenditures did not vary more than $2.59 per pupil in the secondary subject areas. In kindergarten, the difference was $4.58 per pupil.

Procedures

The three school districts used computer and accounting systems in their operations which could provide the necessary information.

Meetings were held before and during the study with the three assistant superintendents in charge of business affairs to work out a standard method of allocating costs.

The following procedures were used by the three districts:

A. CALCULATIONS OF PUPIL TOTALS

1. Total Elementary and Total Secondary

1971-72 - Average Daily Membership as of the first marking period was used for pupil enrollment calculations.

1972-73 - Average Daily Membership as of the end of the first marking period was used for pupil enrollment calculations.

2. Enrollment for Individual Subject Areas Per Day

Equivalent student calculations were performed as follows:

Student enrollment in course at the end of the first marking period x periods per week = total pupil periods.

Semester equation (semester = 2; year = 1) x days per week = equivalent days.

Total pupil periods ÷ equivalent days = equivalent students per subject.

All equivalent pupils per subject added together = total equivalent pupils per subject area.

Example of equation:

1,000 student enrollment x 4 periods per week = 4,000 total pupil periods.

1 year course x 5 days per week = 5 equivalent days.

4,000 total pupils periods ÷ 5 equivalent days = 800 equivalent students per subject.

B. PRORATION OF EXPENSES

1. Expenses not charged directly to subject areas (principal salaries).

Expenses that are not charged directly to a subject area are prorated by using the following formula:

Total full-time equivalent subject enrollment ÷ total A.D.M. = per cent of proration

Per cent of proration x total expense = amount to be charged to subject area.

2. Proration of Teacher Salaries

In charging teacher salaries to a specific subject area, actual teaching time as well as preparation time was included. Not included was the percentage of time that a teacher used to monitor study halls, lunchroom duty, school activities, etc., that are not related to a specific subject area. Also, not included were salaries for substitute teachers and payments made to teachers on sabbatical leave in calculating either total secondary and elementary costs or costs of specific subject areas.

All special education costs and ESEA costs were not included.

3. Calculation of School District Fixed Charges

This refers to the school district's contribution to retirement, Social Security and workmen's compensation and employe insurances.

In calculating retirement, the total salaries charged to a specific area were multiplied by 4.95 per cent for 1971-72 and 5.2 per cent for 1972-73.

Social Security, workmen's compensation and employe insurance included in this project have been calculated by using the following formula:

$$\frac{\text{total dollars for } \begin{pmatrix}\text{Social Security or}\\ \text{workmen's comp. or}\\ \text{employe insurance}\end{pmatrix}}{\text{total salaries}} = \text{per cent}$$

$$\text{per cent} \times \text{total project salaries} = \text{amount of } \begin{pmatrix}\text{Social Security}\\ \text{or workmen's comp.}\\ \text{or employe insur-}\\ \text{ance}\end{pmatrix}$$

These amounts were then prorated between elementary and secondary. Secondary was then prorated by subject areas.

C. PUPIL-TEACHER RATIO

Calculation of Pupil-Teacher Ratio

In calculating a teacher count for the different areas, the number of periods worked in a week by a teacher in a specific area was divided by 5 days a week. This gave the average number of periods a teacher taught on an average day. Anyone who averaged less than 5 periods a day was counted as a fraction of a teacher. These figures were added and the results were divided into the equivalent students per subject area (see equation under enrollment) to give the pupil-teacher ratio per area.

Example:

Teacher #1 25 periods per week ÷ 5 days = 5 periods per day = 1 teacher

Teacher #2 20 periods per week ÷ 5 days = 4 periods per day = .8 teacher
Total teachers per subject area = 1.8

Equivalent students per subject area 180 ÷ 1.8 teachers = 100:1 pupil-teacher ratio.

D. AVERAGE TEACHER SALARIES

Calculation of Average Teacher Salary Per Subject

In calculating average teacher salary, 100 per cent of teacher's salary was used if that was the only subject area taught. Those who taught more than one subject area were prorated accordingly. Then the total amount of salaries was added and divided by the number of full-time equivalent teachers.

Example:

Teacher #1	1 subject	$10,000.00	1.0
Teacher #2	2 subjects @ 50%	5,000.00	.5
		$15,000.00	1.5

$15,000.00 ÷ 1.5 = $10,000.00 average teacher salary.

Description of Accounts

211 Salaries of Principals and Assistant Principals

Salaries for principals and assistant principals on both the elementary and secondary levels.

212 Salaries of Supervisors

Salaries are included for:

1. Curriculum Coordinator
2. Administrative Assistant
3. Supervisor of Library Services
4. Supervisor of Music
5. Elementary & Secondary Subject Chairman
6. Coordinator of Vocational Programs

213 Salaries of Teachers

The salaries for all other subject areas for total elementary and total secondary, with the exception of special education and ESEA programs. Vocational educational program teacher salaries are also a part of our total secondary salary costs. Substitute teachers and sabbatical leaves have been excluded.

214 Salaries of Librarians

Salaries for librarians and library aides

218 Salaries of Instructional Assistants

Salaries of teacher aides. Teacher aides on the elementary level only were employed by the smallest district, while the other districts employed teacher aides in elementary and secondary areas.

219 Salaries of Secretaries and Clerical Personnel

Salaries of all building secretaries and clerks who were involved in the instructional part of the operation.

221 Textbooks

Cost for all textbooks for all subject areas excluding special education and ESEA programs were included for the total elementary and total secondary.

222 Teaching Supplies

Costs for general supplies, instructional aides, tests and workbooks. Again, all subject areas have been included for total elementary and total secondary with the exception of special education and ESEA programs.

223 Library Books and Supplies

Costs for library books and supplies, reference books, repairs and binding, and periodicals.

224 Audio-Visual Materials

Costs for films, filmstrips, recordings, maps, charts, exhibits, and rentals for same. Special education and ESEA programs have been excluded.

229 Other Materials and Supplies

Costs for materials and supplies for instruction not consumed in the actual teaching-learning process, including office supplies, curriculum supplies, professional books and subscriptions for the instructional staff, supplies for school exhibits, and supplies for graduation including certificates and diplomas.

231 In-Service Training

Costs for in-service training programs and reimbursement for tuition for credits earned by the instructional staff.

239 Other Expenses for Instruction

Costs for travel, memberships, college night, and other expenses of instructional personnel for attending meetings and conventions not chargeable to in-service training.

250 Contracted Services for Instruction

Costs for assembly speakers and programs, test scoring, evaluation, student scheduling, rental of gowns and flowers, speaker for graduation exercises, and other contracted services.

311 Salaries of Directors, Coordinators and Supervisors

Cost of salary of the supervisor of guidance services.

312 Salaries of Attendance Personnel

Salary of clerk in the administration office who handles attendance and census information.

313 Salaries of Guidance Personnel

Costs of guidance counselors in the intermediate, junior and senior high schools.

319 Salaries of Clerical Personnel

Costs of clerical assistance for guidance counselors.

320 Materials and Supplies for Pupil Personnel Services

Costs of supplies used by guidance and attendance personnel.

330 Expenses--Pupil Personnel Services

Costs of expenses for guidance and attendance personnel.

623 Materials and Supplies for Maintenance of Instructional Equipment

Costs of supplies and repair parts used in the maintenance of instructional equipment.

643 Equipment Replacement--Instructional

Costs of replacing instructional equipment

653 Contracted Maintenance--Instructional Equipment

Costs of retaining outside professionals for maintaining our instructional equipment.

831 School District Contributions to Employe Retirement

The school district's contribution to the Public School Employes' Retirement Board. The amount is based on 4.95 per cent for 1971-72 and 5.2 per cent for 1972-73 of all full-time employes' salaries. (See page 8 for procedures explaining proration of these funds.)

832 School District Share of Social Security Taxes

The school district's contribution to the Federal Social Security Administration. (See page 8 for procedures explaining proration of these funds.)

833 Workmen's Compensation Insurance Premium

Premium for compensation insurance. The premium is based on approximately 18 cents per $100 of remuneration for all employes. (See page 8 for procedures explaining proration of these funds.)

834 Employe Insurance Premiums

The school district's share of employe insurance premiums. The school offers group life insurance, group income protection and group hospitalization plans. The explanation for proration of these funds may be found on page 8.

1243 Instructional Equipment--Initial Purchase

Included in this account were the costs of initial purchases of instructional equipment.

Analysis of Instructional Cost by Subject

A detailed analysis of instructional per pupil costs by budget categories differences in the five secondary subjects, total cost of foreign languages and elementary costs (K-6) follows:

K-6

The total difference between the low cost district (7,621 pupils) and the high cost district (13,279 pupils) was $9.53. The total difference between the low cost district (7,621 pupils) and the median cost district (4,603 pupils) was 44 cents. In kindergarten through grade 6, the highest cost was found in the largest district. Differences in teacher salaries were almost three times higher than the total difference ($9.53)* between the low and high cost districts.

The higher teacher and aide salaries, higher librarian salaries, retirement contributions, employe insurance and teaching supplies in the high cost district were greatly offset by the lower supervisor salaries and other expense. Other expense cost differences (for such items as travel and other materials) were over three and one-half times less than the total difference in costs for the high cost vs. the low cost district.

The high cost district (largest) had 17 per cent of the teachers with 20 or more years of experience, which would partially account for the much higher per pupil cost for teachers. The low cost district (median) had no elementary teachers with more than 15 years' experience, but with a much higher cost for teacher aides. This district has a policy which permits building principals to trade a teaching position for four aide positions. (See Appendix, page 30)

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*This and all following references to per cent of the difference refers to the percentage of the total difference between the low and the high cost districts.

The median cost district (smallest) had 23.06 per cent of the teachers with 20 or more years of experience. Pupil-teacher ratios (K-6) were very close for all three districts.

TABLE 5

K-6 Cost Differences Per Pupil
1971-1972

Budget Categories	Difference Low Cost vs. High Cost District	Difference Low Cost vs. Median Cost District
Teacher and aide salaries	$ 26.20	$ 4.65
Supervisor salaries	- 6.40	- 2.92
Librarian salaries	16.43	10.39
School district contribution to retirement	.37	.27
School district share to employe insurance	4.98	1.14
Teaching supplies	2.67	- 1.91
Other expense	-34.72	-11.18
TOTAL	$ 9.53	$ .44

Pupil-Teacher Ratios
(K-6)

Low Cost District B 4,039 Pupils*	Median Cost District A 2,416 Pupils*	High Cost District C 6,484 Pupils*
22.1/1	20.7/1	21/1

*Indicates number of pupils K-6.

Social Studies

In social studies, the highest cost was found in the smallest district. Teacher and aide salaries accounted for 94 per cent of the total difference between the low (7,621 pupils) and high (4,603 pupils) cost districts, while the teacher and aide salaries were 30.5 per cent of the difference between the low and median (13,279 pupils) cost districts. Supervisor salaries were about 6.5 per cent higher in the low cost district than the high cost district. Supervisor salaries were 14.7 per cent higher in the median cost district than the low cost district. (Table 6)

The median cost district (13,279 pupils) had only 7.4 per cent of the faculty with 20 or more years' experience. The low cost district (6,621 pupils) had 15 per cent of the faculty with over 20 years' experience, while the high cost district (4,603 pupils) had 47 per cent of the faculty with over 20 years' experience. (See Appendix, page 31)

The low pupil-teacher ratio 114.6/1 in the high cost district (4,603 pupils) also contributed to the higher per pupil cost. The low cost district (6,621 pupils) had the highest pupil-teacher ratio 141/1. The low cost district (6,621 pupils) spent more for supervisors, but less for librarians, retirement, insurance and other expense.

TABLE 6

Per Pupil Cost Differences in Social Studies
1971-1972

Budget Categories	Difference Low Cost vs. High Cost District	Difference Low Cost vs. Median Cost District
Teacher and aide salaries	$ 15.86	$ 5.16
Supervisor salaries	- 1.11	2.49
Librarian salaries	.48	1.41
School district contribution to retirement	.55	1.12
School district share to employe insurance	4.98	1.27
Teaching supplies	- .97	- .04
Other expense	1.73	3.63
TOTAL	$ 16.89	$ 15.04

Pupil-Teacher Ratios
(Social-Studies)

Low Cost District B 3,553 Pupils	Median Cost District C 6,855 Pupils	High Cost District A 2,062 Pupils
141/1	135/1	114.6/1

Mathematics

In mathematics, the highest cost occurred in the largest district (13,279 pupils). Teacher and aide salaries accounted for 66.71 per cent of the difference between the low (4,603 pupils) and the high cost districts, while teacher salaries were 80 per cent of the difference between the low and median (7,621 pupils) cost districts.

Supervisor salaries were 16.96 per cent higher in the high cost district than the low cost district, while supervisor salaries were 10.87 per cent higher in the median cost than the low cost district.

The median cost district (7,621 pupils) had 12 per cent of the faculty with 20 or more years' experience. The low cost district (4,603 pupils) had 6.25 per cent of the faculty with 20 or more years' experience while the high cost district (13,279 pupils) had 7.1 per cent.

TABLE 7

Per Pupil Cost Differences in Mathematics
1971-1972

Budget Categories	Difference Low Cost vs. High Cost District	Difference Low Cost vs. Median Cost District
Teacher and aide salaries	$ 14.91	$ 17.95
Supervisor salaries	3.79	2.43
Librarian salaries	.81	- .57
School district contribution to retirement	1.61	.95
School district share to employe insurance	1.41	.36
Teaching supplies	.06	- .43
Other expense	- .24	- 1.59
TOTAL	$ 22.35	$ 19.10

Pupil-Teacher Ratios
(Mathematics)

Low Cost District A 1,788 Pupils	Median Cost District B 3,037 Pupils	High Cost District C 5,821 Pupils
124.2/1	130.9/1	144/1

Although the high cost district had the highest pupil-teacher ratio which should reduce the per pupil cost, the higher cost for supervisors, librarians, retirement and employe insurance increased the per pupil cost sufficiently to make it the highest of the three. The higher general salary schedule also resulted in the high cost district paying more to retirement. (Table 7)

Science

In science, the highest cost was found in the largest district. Teacher salaries accounted for 61.72 per cent of the difference between the low (7,621 pupils) and high (13,279 pupils) cost districts, while teacher salaries were only .85 per cent of the difference between the low and median (4,603 pupils) cost districts. Supervisor salaries were 5.66 per cent of the difference higher in the high cost district than in the low cost district, while the difference in supervisor costs in the median district was 7.88 per cent lower than the low cost district. (Table 8)

TABLE 8

Per Pupil Cost Differences in Science
1971-1972

Budget Categories	Difference Low Cost vs. High Cost District	Difference Low Cost vs. Median Cost District
Teacher and aide salaries	$ 16.67	$ .23
Supervisor salaries	1.53	- 2.13
Librarian salaries	1.38	.49
School district contribution to retirement	- .18	- .35
School district share to employe insurance	1.55	.14
Teaching supplies	1.95	- .07
Other expense	4.11	3.02
TOTAL	$ 27.01	$ 1.33

Pupil-Teacher Ratios
(Science)

Low Cost District B 3,099 Pupils	Median Cost District A 1,955 Pupils	High Cost District C 6,031 Pupils
134.9/1	120.7/1	127/1

Teaching supplies were 7.22 per cent of the difference more in the high cost district than in the low cost district, while in the median cost district teaching supplies were only .26 per cent less than in the low cost district.

Other expense was 15.22 per cent more of the difference in the high cost district than in the low cost district, while in the median district it was 11.18 per cent higher than the low cost district.

The median cost district (4,603 pupils) had 11.1 per cent of the faculty with 20 or more years' experience compared to 7.7 per cent of the low cost district faculty (7,621 pupils) with 20 or more years' experience. The high cost district (13,279 pupils) had two per cent of the faculty with 20 or more years' experience. (See appendix.)

The low cost district (7,621 pupils) had the highest pupil-teacher ratio, 134.9/1. The median cost district had the lowest pupil-teacher ratio, 120.7/1. The lower all other costs in the median cost district resulted in a lower cost per pupil than the high cost district, which had a pupil-teacher ratio of 127/1. (Table 8)

English

In English, most of the cost difference (86.76 per cent) between the low cost district (4,603 pupils) and the high cost district (6,621 pupils) occurred between the expenditure for teacher and aide salaries. This compared to a difference of 39 per cent for these categories between the low cost district and the median cost district.

The pupil-teacher ratio difference was only 1.7 pupils between the low cost district and the high cost district. Therefore, most of the cost difference is due to higher salaries paid to more experienced teachers in the high cost district.

Twenty-two per cent of the difference was for supervisors in the median district compared to seven per cent in the high cost district.

The experience level of the English teachers in the high cost district was greater (25 per cent with 20 or more years) than in the low cost district (17 per cent with 20 or more years). The median cost district had the fewest teachers with over 20 years' experience (nine per cent).

Although the low cost district (4,603 pupils) had the smallest ratio of pupils to teachers (118.7/1), which should increase the per pupil cost, the less experienced faculty, fewer supervisors, less spent on librarians, employe insurance and other expense resulted in a lower per pupil cost for English.

TABLE 9

Per Pupil Cost Differences in English
1971-1972

Budget Categories	Difference Low Cost vs. High Cost District	Difference Low Cost vs. Median Cost District
Teacher and aide salaries	$ 14.29	$ 6.44
Supervisor salaries	1.15	3.70
Librarian salaries	- .48	.93
School district contribution to retirement	.65	1.10
School district share to employe insurance	.05	1.09
Teaching supplies	- .26	- .57
Other expense	1.07	2.51
TOTAL	$ 16.47	$ 15.20

Pupil-Teacher Ratios
(English)

Low Cost District A 3,014 Pupils	Median Cost District C 6,814 Pupils	High Cost District B 3,515 Pupils
118.7/1	132/1	120.4/1

The median cost (largest) district had almost as high a total per pupil cost difference as the high cost district. The largest district's faculty also had less experience (nine per cent with 20 or more years' experience). The largest district's higher pupil-teacher ratio (132/1) also helped reduce the cost, although more was spent for supervisors, librarians, retirement, insurance and other expense. The largest district also had the highest general teachers' salary scale. If the largest district had the same per cent of more experienced English teachers as the high cost district, then its per pupil cost would have been the highest instead of the median cost.

Foreign Language

In foreign language, the highest cost was found in the smallest district. Teacher salaries differences per pupil were greater than the total difference between the low and high cost districts, while teacher salaries were 83.78 per cent of the difference in the median cost district. Supervisor salaries were lower in the high cost than in the low cost district. Librarian salaries, retirement, employe insurance, instructional supplies and other expense were all higher in the high cost district.

In the median cost district, supervisor salaries, librarian salaries, retirement, employe insurance and teaching supplies were more. Teacher and aide salaries were considerably less and other expense was a great deal less.

TABLE 10

Per Pupil Cost Differences in Foreign Language
1971-1972

Budget Categories	Difference Low Cost vs. High Cost District	Difference Low Cost vs. Median Cost District
Teacher and aide salaries	$ 5.43	$- 4.03
Supervisor salaries	- 2.99	.66
Librarian salaries	.45	1.42
School district contribution to retirement	.17	.58
School district share to employe insurance	.24	1.13
Teaching supplies	1.01	2.69
Other expense	.50	- 7.67
TOTAL	$ 4.81	$ 2.84

Pupil-Teacher Ratios
(Foreign Language)

Low Cost District B 1,267 Pupils	Median Cost District C 2,715 Pupils	High Cost District A 724 Pupils
106.9/1	122/1	92.8/1

The low cost district (7,621 pupils) had 14.3 per cent of the faculty with 20 or more years' experience. The high cost district (4,603 pupils) had 12.5 per cent of the foreign language faculty with 20 or more years' experience, while the median cost district (13,279 pupils) had 4.5 per cent of the faculty with 20 or more years' experience.

The high cost district had the lowest pupil-teacher ratio which would increase the per pupil cost. The high cost district also had the highest average teacher salaries.

French I

In French I, the highest cost was found in the smallest district. Teacher salaries differences per pupil were about 43 per cent greater than the total difference between the low and high cost districts. The difference per pupil in teacher salaries between the median and low cost districts was almost as great.

TABLE 11

Per Pupil Cost Differences in French I
1971-1972

Budget Categories	Difference Low Cost vs. High Cost District	Difference Low Cost vs. Median Cost District
Teacher and aide salaries	$ 30.91	$ 29.14
Supervisor salaries	4.85	- 3.64
Librarian salaries	1.23	- .96
School district contribution to retirement	.62	.63
School district share to employes insurance	.56	- .37
Teaching supplies	2.59	- 2.53
Other expense	-19.56	- 2.23
TOTAL	$ 21.20	$ 20.04

Pupil-Teacher Ratios
(French I)

Low Cost District C 202 Pupils	Median Cost District A 370 Pupils	High Cost District B 241 Pupils
142/1	86.1/1	105.2/1

In the high cost district (4,603 pupils), supervisor salaries, librarian salaries, retirement, employe insurance and teaching supplies were higher than the low cost district (7,621 pupils). Other expense was 92.26 per cent lower in the high cost district.

In the median cost district (13,279 pupils), supervisor salaries, librarian salaries, employe insurance, instructional supplies and other expense were lower than in the low cost district. Retirement contributions were higher and teacher and aide salaries were much higher for the median cost district than in the low cost district.

None of the districts had teachers with 20 or more years' experience teaching French. However, the low cost district had a faculty with no more than five years' experience, the median cost district had a faculty with no more than 17 years' experience and the high cost district a faculty with no more than 19 years' experience.

The low cost district not only had the youngest faculty, but also the highest pupil-teacher ratio (142/1). Both conditions would lower the cost. The median cost district had a low pupil-teacher ratio (86.1/1); however, the lower cost for other expense in the median district resulted in a per pupil cost very close to the high cost district.

Analysis of 1972-1973 Budgeted Cost Data

Budgeted data for the same subjects was provided by the same three school districts for the 1972-73 school year. Since budgeted data is an estimate for the year, comparing the 1971-72 actual costs to the budgeted costs for 1972-73 does not give true differences. Such differences, however, may be useful to school boards and administrators. The differences between the 1971-72 costs and 1972-73 budgeted costs in this study can point out where fiscal or policy decisions affected expenditures.

The smallest district budgeted the lowest expenditure per pupil in three subjects in 1972-73 (English, mathematics and foreign language) compared to two subjects in 1971-72. The median-sized district budgeted less money per pupil in 1972-73 in three subjects (social studies, science and kindergarten) compared to four subjects in 1971-72. The largest district budgeted one subject (French I) as the lowest amount per pupil in 1972-73, as they had in 1971-72.

The smallest district budgeted the highest cost in 1972-73 in two areas (social studies and French I). The median-sized district budgeted the highest amount per pupil in one area (English). The largest district was highest in four subjects (mathematics, science, foreign language and kindergarten).

The median amount was budgeted by the smallest district in two subjects (science and kindergarten), the median-sized district in three subjects (mathematics, French I and foreign language) and the smallest district in two subjects (science and kindergarten).

The total per pupil costs, pupil-teacher ratio and average teacher salary by subject is given for 1972-73 budgeted data in Table 12.

Without comparing other budget categories, it is evident that pupil-teacher ratios have a great effect on total per pupil costs of different subjects.

In kindergarten-6, where teacher-pupil ratios are within two pupils difference, the increased teacher salary is the greatest factor which increased the per pupil total cost. (This was indicated from the analysis of 1971-72 actual data.)

In social studies, a slightly lower teacher-pupil ratio, but a considerably higher average teacher salary for District C greatly increased the pupil total cost for the median cost district. A large drop in pupil-teacher ratio with a small additional increase in average teacher salary resulted in a higher pupil total cost for District A.

TABLE 12

Budgeted Data for 1972-1973

Kindergarten-6

	District B (3,944 pupils)	District A (2,366 pupils)	District C (6,250 pupils)
Total per pupil cost	$691.19	$736.64	$752.38
Pupil-teacher ratio	21.9/1	20.3/1	21.0/1
Average teacher salary	$10,092.00	$10,430.00	$12,018.00

Social Studies

	District B (3,765 pupils)	District C (7,009 pupils)	District A (2,345 pupils
Total per pupil cost	$90.20	$114.80	$120.28
Pupil-teacher ratio	145.2/1	140.0/1	115.0/1
Average teacher salary	$10,367.00	$11,477.00	$11,942.00

Mathematics

	District A (1,701 pupils)	District B (3,195 pupils)	District C (5,684 pupils)
Total per pupil cost	$91.14	$99.72	$118.19
Pupil-teacher ratio	126.9/1	137.5/1	137.0/1
Average teacher salary	$9,164.00	$10,688.00	$11,965.00

Science

	District B (3,230 pupils)	District A (1,792 pupils)	District C (6,087 pupils)
Total per pupil cost	$98.62	$113.73	$134.22
Pupil-teacher ratio	144.7/1	119.5/1	126.0/1
Average teacher salary	$9,851.00	$10,580.00	$12,380.00

TABLE 12 (Continued)

English

	District A (2,517 pupils)	District C (7,126 pupils)	District B (3,640 pupils)
Total per pupil cost	$96.81	$110.15	$112.60
Pupil-teacher ratio	119.9/1	139.0/1	133.8/1
Average teacher salary	$9,771.00	$10,838.00	$10,671.00

Foreign Language

	District A (758 pupils)	District B (1,374 pupils)	District C (2,645 pupils)
Total per pupil cost	$115.13	$116.42	$126.38
Pupil-teacher ratio	108.3/1	118.7/1	120.0/1
Average teacher salary	$10,562.00	$10,448.00	$10,734.00

French I

	District C (390 pupils)	District B (202 pupils)	District A (245 pupils)
Total per pupil cost	$103.82	$119.47	$126.04
Pupil-teacher ratio	130.0/1	112.2/1	111.4/1
Average teacher salary	$8,937.00	$10,357.00	$11,993.00

Mathematics gives a good illustration of how a lower pupil-teacher ratio for the lowest cost district (District A) is offset by the considerably lower average teacher salary. In the median cost district (District B) and the high cost district (District C), where the pupil-teacher ratio was almost the same, the higher salary in District C caused a much higher pupil total cost.

In science, the higher pupil-teacher ratio in District C over District A did not offset the higher average teacher salary enough to result in lower total pupil costs than District A.

English illustrates where a higher pupil-teacher ratio in District C results in a lower total pupil cost, even though the average teacher salary is higher (District C compared with District B).

Foreign language illustrates where a lower pupil-teacher ratio (District A) and a higher average teacher salary exists and a lower pupil total cost results. These two factors increase costs, thus other cost categories must account for the smaller cost.

French I illustrates where higher pupil-teacher ratios and a lower average teacher salary result in a considerable lower total pupil cost (District C).

The higher average salary in District A results in a considerably higher total pupil cost, although the pupil-teacher ratios for District B and District A are within one pupil difference.

Conclusions

This type of cost analysis can give the school administration and school board the necessary information upon which to make several types of decisions:

(a) The total cost of teaching various subjects can be compared to determine if the cost is too far from normal to justify the course offering. For example, Russian may be costing one and one-half times the cost of another foreign language. This might be justified if the total cost is not too great and it satisfies the educational needs of the district.

(b) Pupil-teacher ratios are valuable by subject area since normally one would expect less pupils per teacher in English, mathematics and science than in social studies. Decisions on the number of teachers needed can be based on such data.

(c) Identification of the variables which are causing the difference should help administrators to react intelligently in making administrative or policy decisions directed toward controlling expenditures for particular subjects.

(d) The teacher experience chart by subject is useful to the administration in establishing employment policies. A very experienced staff may call for some younger teachers and vice versa. (This chart can be developed without the use of a computer.)

(e) School districts could use the per pupil cost in one building for teaching a particular subject to compare the cost in another building. If such costs could be related to measurement of achievement in each building, then intelligent decisions could be made regarding program changes and an evaluation of the cost of programs can be made.

(f) From this study, one cannot state that size of district alone resulted in different costs. More important were policy and administrative decisions which affected the per pupil costs. Such variables as pupil-teacher ratio, experience level of teachers, holding power of the district for teachers, salary schedules, fringe benefits, use of aides, supervisors and amount of teaching supplies have a greater influence on per pupil subject costs than size of district alone. Many factors existing in larger districts cause costs to increase. Such things as the existence of more supervisors, more educational supplies and other increased budgeted categories increase cost. However, unless a more effective program for students results, such additional costs may not be justified.

APPENDIX

District A

Years of Experience and Degree Level of Teachers
Elementary - 1971-72

Years of Service	S*	B	B+15	M	M+15	M+30	Total
1		10					10
2		4					4
3		12	3				15
4		2	10				12
5		1	5	2			8
6			4				4
7		1	1	1			3
8		1	3	1			5
9		2	2				4
10			2				2
11		2	2			1	5
13		1	1	1			3
14		2	1				3
15		3	1				4
16		2					2
17		2		2			4
18				1			1
19		1					1
20		1			1		2
21	2						2
22		1					1
23			1				1
24				1			1
25		1					1
26	1						1
27		3		1			4
28	1				1		2
29		1					1
31		2					2
32		2					2
34	1						1
35		1					1
37	2						2
42	1			1			2
44	1						1
TOTAL	9	58	35	11	2	1	117

*Standard Certificate

APPENDIX (Continued)

District B

Years of Experience and Degree Level of Teachers
Elementary - 1971-72

Years of Service	S	B	+15	M or +30	+45	+60	+75	Total
1		10	1	1	1		1	14
2		6	1	4				11
3		6	5	1				12
4		7	10	5	1			23
5		4	8	8	1	1	1	23
6		1	1	3	2	2		9
7		2	3	4	1			10
8			4	2			1	7
9				3	1	1	1	6
10		4	3		4			11
11		2	2	5		1		10
12		1	1	1	2	1		6
13	3	7	3		3			16
14				15	5	2		22
15						2	3	5
TOTAL	3	50	42	52	21	10	7	185

APPENDIX (Continued)

District C

Years of Experience and Degree Level of Teachers
Elementary - 1971-72

Years of Service	S	B	B+15	B+30 Masters	B+45 M+10	**B+55 M+20	**B+65 M+30	Total
1		8						8
2		30						30
3		20	16	3				39
4			14	5	1			26
5		3	10	8	1			22
6		2	4	8	1	1		16
7		2	3	6				11
8		3	5	4	1			13
9		1	9	3	1	1	1	16
10		2	1	3	2		1	9
11				4	1	1	1	7
12		2	3	2				7
13		4	2	2	4		1	13
14		2	1	1				4
15		1	2	3	3			9
16		1	1	5		1		8
17		1	2	4	3	1		11
18		3	2	5	2		1	13
19		1		1	3		2	7
20		2		5	2		1	10
21		1		2	3			6
22		1	1	5		2		9
23		1						1
24		1					1	2
25		2		1				3
26		1		1				2
27		1		1				2
28		1		1	1			3
29		2					1	3
30		2						2
31		1						1
32		2						2
33							1	1
34		1						1
35		1	1					2
37		1		1				2
38		1						1
40				1				1
42		1						1
TOTAL		115	77	85	29	7	11	324

**Masters included

APPENDIX (Continued)

District A

Years of Experience and Degree Level of Teachers
Social Studies - 1971-72

Years of Service	B	B+15	M	M+15	M+30	Total
4	1	1				2
5	1					1
9		1	1			2
12			2			2
14	1					1
15	1					1
17				1		1
19	1					1
22	1		1			2
25			1			1
27			1			1
29				1		1
33	1					1
36			1			1
37						1
TOTAL	8	2	7	2		19

APPENDIX (Continued)

District B

Years of Experience and Degree Level of Teachers
Social Studies - 1971-72

Years of Service	B	B+15	M	M+15	M+30	Total
1	1			1		2
2	1					1
3		2	1			3
4			1	1	2	4
5			2			2
6		1		1		2
7					1	1
8			1			1
12					1	1
14			2			2
17		1			1	2
18				1		1
19					1	1
21			1			1
22				1		1
25	1					1
26	—	—	—	—	1	1
TOTAL	3	4	8	5	7	27

APPENDIX (Continued)

District C

Years of Experience and Degree Level of Teachers
Social Studies - 1971-72

Years of Service	B	B+15	B+30 Masters	B+45 M+10	B+55 M+20	B+65 M+30	Total
1	1						1
2	5		1				6
3	7		1				8
4	2	6	2				10
5		1	1				2
6	1		1	1			3
7			2	1			3
8	1		1			1	3
9		1					1
10		1		1			2
11						1	1
13					1		1
14				1			1
16					1		1
17	1	1				1	3
18			1				1
19	1		2				3
20			3	1			4
TOTAL	19	10	15	5	2	3	54

APPENDIX (Continued)

District A

Years of Experience and Degree Level of Teachers
Mathematics - 1971-72

Years of Service	B	B+15	M	M+15	M+30	Total
1	2					2
2	4	1				5
3	1					1
4		1				1
5		2				2
6			1			1
7				1		1
9		1				1
11			1			1
37	—	1	—	—	—	1
TOTAL	7	6	2	1		16

District B

Years of Experience and Degree Level of Teachers
Mathematics - 1971-72

Years of Service	B	B+15	M	M+15	M+30	Total
1	2		1			3
2	1					1
3	1	1				2
4		1				1
5	1	1	2			4
7				1		1
8			1			1
9		1				1
12			1			1
13			1	1		2
15					2	2
16			1			1
18			2			2
22				1	1	2
36	—	1	—	—	—	1
TOTAL	5	5	9	3	3	25

APPENDIX (Continued)

District C

Years of Experience and Degree Level of Teachers
Mathematics - 1971-72

Years of Service	B	B+15	B+30 Masters	B+45 M+10	B+55 M+20	B+65 M+30	Total
1	1						1
2	4		1				5
3	6						6
4	1	5	1				7
5			1				1
6			1	1			2
7			1			1	2
8			1	1			2
9			2	1			3
10					1		1
13			1		1		2
14				1		2	3
15	1						1
17				1			1
18			1				1
19			1				1
21	1						1
28				1			1
31						1	1
TOTAL	14	5	11	6	2	4	42

APPENDIX (Continued)

District A

Years of Experience and Degree Level of Teachers
Science - 1971-72

Years of Service	B	B+15	M	M+15	M+30	Total
1	6					6
2	2					2
3	1					1
5		2				2
7		1				1
8		1				1
14			2			2
17					1	1
36			1			1
41			1			1
TOTAL	9	4	4		1	18

District B

Years of Experience and Degree Level of Teachers
Science - 1971-72

Years of Service	B	B+15	M	M+15	M+30	Total
1	3	1	1		1	6
2		1				1
3					1	1
4		1	1			2
5	1		3		3	7
6			1			1
8				1		1
9			1			1
11					1	1
13					1	1
16					1	1
18					1	1
20			1		1	2
TOTAL	4	3	8	1	10	26

APPENDIX (Continued)

District C

Years of Experience and Degree Level of Teachers
Science - 1971-72

Years of Service	B	B+15	B+30 Masters	B+45 M+10	B+55 M+20	B+65 M+30	Total
1				1			1
2	3						3
3	4						4
4	3						3
5		2	1				3
6			2	2			4
7	1		3		1	1	6
8			2			1	3
9		1					1
10			2			1	3
11				1	2	1	4
12	1	1	1			1	4
13				1		2	3
14				1	1		2
15				1			1
18						1	1
19						2	2
21						1	1
TOTAL	12	4	11	7	4	11	49

APPENDIX (Continued)

District A

Years of Experience and Degree Level of Teachers
English - 1971-72

Years of Service	B	B+15	M	M+15	M+30	Total
1	2					2
2	6					6
3	6	1				7
4		2				2
5		1				1
6		1				1
14			1			1
15		1				1
17	1		2			3
21	1	1				2
34	1					1
44			1			1
45				1		1
TOTAL	17	7	4	1		29

APPENDIX (Continued)

District B

Years of Experience and Degree Level of Teachers
English - 1971-72

Years of Service	B	B+15	M	M+15	M+30	Total
1	7					7
2			1			1
3		1	1			2
4			2			2
5			2			2
6				1		1
7				1	1	2
8		1				1
10		1			1	2
14			1	1		2
18			2			2
19					1	1
21			1		1	2
23					1	1
25		1				1
35		1				1
36					1	1
42					1	1
TOTAL	7	5	10	3	7	32

APPENDIX (Continued)

District C

Years of Experience and Degree Level of Teachers
English - 1971-72

Years of Service	B	B+15	B+30 Masters	B+45 M+10	B+55 M+20	B+65 M+30	Total
1	1						1
2	3					1	4
3	5		2				7
4	7	2					9
5	1	1	1	1		1	5
6	3	3	1				7
7	1	1	1				3
8		1	2				3
9	1	1	1	1			4
10		1	1				2
11			1		1		2
12		1					1
14				1			1
16					1		1
19		1		1		1	3
21				1			1
27				1			1
TOTAL	22	12	10	6	2	3	55

APPENDIX (Continued)

District A

Years of Experience and Degree Level of Teachers
Foreign Language - 1971-72

Years of Service	B	B+15	M	M+15	M+30	Total
2	1					1
3		1				1
4		1				1
10	1					1
11	1					1
12	1					1
17			1			1
46	–	–	–	1	–	8
TOTAL	4	2	1	1		8

District B

Years of Experience and Degree Level of Teachers
Foreign Language - 1971-72

Years of Service	B	B+15	M	M+15	M+30	Total
2	3					3
3		1				1
4		1				1
6			1		1	2
9				1		1
11				2		2
13			1			1
19				1		1
21	1	1	–	–	–	2
TOTAL	4	3	2	4	1	14

APPENDIX (Continued)

District C

Years of Experience and Degree Level of Teachers
Foreign Language - 1971-72

Years of Service	B	B+15	B+30 Masters	B+45 M+10	B+55 M+20	B+65 M+30	Total
1	2					1	3
3	3						3
4	4	1	1				6
5		1					1
7					1		1
8			1		1		2
9				1			1
12				1	1		2
18			1				1
19			1				1
22			1				1
TOTAL	9	2	5	2	3	1	22

APPENDIX (Continued)

District A

Years of Experience and Degree Level of Teachers
French I - 1971-72

Years of Service	B	B+15	M	M+15	M+30	Total
4		1				1
11	1					1
17			1			1
TOTAL	1	1	1			3

District B

Years of Experience and Degree Level of teachers
French I - 1971-72

Years of Service	B	B+15	M	M+15	M+30	Total
3		1				1
4		1				1
6			1			1
11			1			1
19				1		1
TOTAL		2	2	1		5

District C

Years of Experience and Degree Level of Teachers
French I - 1971-72

Years of Service	B	B+15	B+30 Masters	B+45 M+10	B+55 M+20	B+65 M+30	Total
1	1					1	2
4	1						1
5	1			1			1
TOTAL	2			1		1	4